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**MICROECONOMICS AND MACROPOLITICS:
A SOLUTION TO THE KRAMER PROBLEM**

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ABSTRACT

Estimation of economic voting models is complicated by the possibility that voters treat certain economic conditions as "politically irrelevant" and do not attribute responsibility for such conditions to the incumbent party. Kramer (1983) suggested that this phenomena could account for the discrepancy between micro survey and aggregate time-series estimates of the economic voting model. Statistical methods are developed for testing the Kramer hypothesis and applied to presidential voting data from 1956 to 1984. With proper treatment, the estimated individual level income effect based on pooled cross-sectional surveys is as large as that found in aggregate time series data. Ordinary regression estimates are shown to be biased by a factor of approximately seven. It is also shown that ordinary regression estimates tend to overstate "sociotropic" or national level economic effects. Nonetheless, even using consistent estimation techniques, sociotropic effects are still found, though they are slightly smaller than the individual level effects.

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1. INTRODUCTION

The connections between micro-level findings on voter behavior and the performance of elections as instruments for popular control over public policy have long been recognized. Early voting studies found most voters to be poorly informed about party and candidate differences and, occasionally, these findings were interpreted as proving the inefficacy of elections as a device for controlling policy-making. These arguments were strongly rebutted, albeit in rather different ways, by Downs (1957) and Key (1966), who proposed the retrospective voting model. Downs and Key pointed out that voters with little information about alternative policies could still vote in such a way as to give parties incentives to produce "desirable" policy outcomes. A voter needs not understand policy alternatives, Downs and Key observed, to decide whether he or she likes the policy outcome. By passing judgment retrospectively, they argued, voters with limited information could still influence macropolitical outcomes in a reasonable way.

In a chapter still worth reading, the authors of the The American Voter noticed a tendency of voters, especially those belonging to the party out of power, to disapprove of the administration's handling of economic policy if they had experienced some economic hardship. (Campbell et al., 1960, pp. 386-393) It remained, however, for Gerald Kramer (1971) to provide an empirical basis for the retrospective voting model. Using aggregate time-

series data on congressional and presidential elections from 1896 to 1964, Kramer showed that most of the fluctuations in aggregate vote totals could be explained by a simple retrospective voting model based on a few macroeconomic indicators. Kramer showed that despite the existence of strong social and psychological ties between voters and parties found in micro survey data, inter-election vote swings exhibited a regular and understandable relation to the economic performance of presidential administrations.

Inevitably Kramer's analysis attracted the attention of survey analysts. Fiorina (1978) and several others, using respondents' self assessments of their family's financial situation, tried to find evidence of voters' assessments of their personal economic situation affecting their voting behavior. Surprisingly, there appeared to be, at best, a weak relationship between a voter's personal financial situation and his or her support for congressional candidates belonging to the president's party. Kinder and Kiewiet (1979) offered an explanation for the discrepancy between the strong aggregate level relation between economic conditions and voting and the weak micro level relation. Instead of responding to their personal economic situation, they argued, voters base their evaluations of incumbents on aggregate economic conditions. In a strongly worded conclusion, Kinder and Kiewiet argue the "political irrelevance of personal economic grievances":

Private economic experience is important, but not for politics.

Economic discontents and political judgments inhabit separate mental domains. (Kinder and Kiewiet, 1979: p. 523)

Instead, they say, voters are "sociotropic":

In reaching political preferences, the prototypic sociotropic voter is influenced most of all by the nation's economic condition. Purely sociotropic citizens vote according to the country's pocketbook, not their own. . . . [T]he party in power suffers at the polls during hard times because voters act on their negative assessments of national economic conditions-- quite apart from the trials and tribulations of their own economic lives. (Kinder and Kiewiet, 1981: p. 132)

Instead of microeconomic considerations driving micropolitical behavior, according to this view, it is macroeconomic conditions which most strongly influence voting.

Kinder and Kiewiet present a variety of evidence in support of the sociotropic voting hypothesis. The bulk of the evidence is cross-sectional and consists of "perceptual" variables such as whether the voter thinks "business conditions are better or worse than they were a year ago." Use of these items raises the issue of how perceptions are formed and why they differ. Kinder, of course, is a leading political psychologist and has investigated this topic in numerous papers. I will not attempt to address the problem of perceptions and their measurement here. The concern of this paper is upon the relative effects of objective individual and aggregate level economic conditions on voting behavior. For purposes of analyzing the electoral consequences of alternative policies, there is little point in complicating the analysis by adding a perceptual mechanism.

Efforts to disentangle various economic influences on voting are plagued by serious statistical problems that were first pointed out by Kramer

(1983) in what might be interpreted as a rejoinder to Kinder and Kiewiet. Kramer analyzed a simple model with "self-interested" and "sociotropic" voting in which an individual's voting behavior depends both on the change in his or her personal income and also on the aggregate income change in the economy. The sociotropic voting hypothesis is that individuals respond primarily to aggregate economic changes. Kramer pointed out that if not all income change is "politically relevant" (i.e., if voters do not attribute responsibility for all income change to the incumbent government), then estimates of the individual income effect from cross-sectional surveys are likely to be biased downward. The effects of aggregate income changes are not identified in a cross-section, while the two effects are confounded in aggregate time-series data.

Whether voters hold government responsible for all or just some changes in their personal financial situation is a controversial question. To determine with any precision what changes in an individual's income are properly attributable to the government policy (or, worse yet, the actions of the incumbent president) would appear to place unreasonable demands upon the inferential powers of the typical voter. It might be argued that voters will minimize information costs and use a simple rule of thumb: if his or her income is up, support the incumbent party; otherwise, vote for the opposition party. On the other hand, this sort of behavior is unrealistically myopic. Voters' incomes are subject to well understood and easily predictable life cycle fluctuations that even the most simple-minded voter would not attribute to government policies. When a voter retires, for example, usually his or her income will drop and, if asked, the voter is likely to say that his or her personal financial situation has worsened (even though he or she might be happier retired than working). It seems

implausible that the voter would base a voting decision on this sort of income change, which was Kramer's point. Ultimately, however, arguments based on plausibility are unconvincing and the question must be settled empirically.

Kramer's critique has had a devastating effect because it calls into question most of the empirical work in the field:

More generally, our analysis suggests that individual-level survey data, at least when analyzed with the usual methods, are not really very useful for studying the effects of short-term economic fluctuations on individual voting decisions. Although it may ultimately be possible to draw valid inferences from such data, this will require careful modelling and specification of the underlying structures and effects to be estimated and sophisticated estimation techniques that take proper account of the subtleties involved.

On the issue of sociotropic voting, which I will argue is critical to any understanding of distributive politics, Kramer argued that the evidence was "artifactual" and that estimation of such a model would be "formidably difficult."

The purpose of this paper is to show that Kramer's analysis is empirically testable with existing survey data. Econometric methods are proposed which effectively solve the problems of estimation and inference posed by Kramer. Estimates based on the American National Election Studies from 1956 to 1984 provide empirical support for both self-interested and sociotropic voting. The magnitude of the effects roughly

reproduce Kramer's (1971) aggregate estimates. While significant sociotropic effects are also found, the estimated effects turn out to be slightly smaller than the individual level effects, not larger.

The approach followed here owes much to Kramer (1983) in spirit, though the style is avowedly empirical. One significant point where I depart from Kramer is that I do not identify the "politically relevant" portion of income change with the fraction that is "government induced." Kramer makes a number of rough macroeconomic calculations to compute a range of possible bias estimates. The plausibility one attaches to these calculations rests upon one's belief that voters attribute political responsibility for income changes roughly in proportion to the income change attributable to government policy by some macroeconomic model. I am not willing to subscribe to a particular macroeconomic model and there is little reason to believe that all voters' economic evaluations are consistent with any single macroeconomic model. If, as I show, it is possible to settle this issue empirically, then such an assumption should be avoided. Throughout, I enclose the term "politically relevant" in quotation marks. Readers who prefer Kramer's interpretation are free to substitute "government induced" for "politically relevant." It seems less controversial to view voters as treating some income changes as "politically relevant" and other income changes as irrelevant and to bypass the issue of why or how they make this determination altogether.

The debate over individual and national level economic effects has implications for policy-making as well as micro models of voter decision-making. The motivations of voters have become, for better or worse, the central focus of empirical voting research. Occasionally this concern has led away from questions about elections as political processes for collective decision-making toward questions about the psychology of individual voting.

One area where psychological and political issues clearly overlap, however, is the study of economic voting. No government today, liberal or conservative, denies responsibility for macroeconomic management, and there is a great deal of evidence that voters do, in fact, hold them responsible for economic conditions. The precise form of the relation between economic conditions and individual political choices, however, is controversial. Because different patterns of individual response provide very different incentives for policymaking, different models of individual decision-making imply distinctive strategies for competing parties or candidates.

If the sociotropic voting hypothesis is correct and voters are relatively insensitive to personal economic hardship so long as aggregate economic performance is favorable, then parties can pursue policies which improve aggregate welfare without worrying too much about their distributional consequences. On the other hand, if voters attribute political responsibility for income declines to the incumbent government, then parties will resist implementing policies with negative redistributive effects on moderately large numbers of voters, even if such policies could be justified on conventional efficiency grounds. (Thurow, 1980, bases his argument on this presumption.) What conclusion one reaches about economic voting ultimately determines whether one believes redistributive issues can or will be settled in the electoral arena.

The plan of the paper is as follows. Section 2 reviews some evidence on individual and national level income effects on presidential voting from 1956 to 1984. Although statistically significant individual effects can be found in presidential voting data, it is shown that the implied macropolitical effects are much smaller in the cross-sectional survey data than in aggregate time-series data. Section 3 discusses econometric issues

that underlie any solution to this puzzle. The specification is essentially that analyzed previously by Kramer. It is shown that the dynamic structure of economic voting models generally leads to an over-identified model, so the primary issue becomes how it is possible to use the data efficiently to test the over-identifying restrictions. A method (two-stage conditional maximum likelihood, abbreviated 2SCML) for consistently and efficiently estimating dynamic voting models is described. Also, it is shown how the key parameter in Kramer's analysis--the fraction of individual income change that is "politically relevant"--can be estimated and hypotheses about its value can be tested. Section 4 presents estimates of the economic voting model. 2SCML estimates are compared with standard OLS estimates which are shown to be badly biased. Section 5 discusses outstanding issues and possible extensions.

2. SOME EVIDENCE ON ECONOMIC VOTING

The focus of this paper is entirely upon presidential voting, while significant portions of the economic voting literature have analyzed congressional voting. Macroeconomic stabilization has become a central concern of contemporary presidents and if voters are to give credit or place blame on anyone it will be the incumbent president. Briefly, we review some survey evidence on the effects of economic conditions on presidential voting. (Kiewiet, 1984, provides a more detailed summary of the presidential voting data, as well as congressional data, using roughly the same approach as this section.)

Table 1 presents the frequency distribution of responses to the standard personal financial situation question that has been included in National Election Studies questionnaires since 1956:

We are interested in how people are getting along financially these days. Would you say that you (and your family) are better off or worse off financially than you were a year ago?

The distribution of responses shifts quite a bit from year to year (a point that will be of some importance in later sections). The 1980 recession, for instance, produces the smallest fraction of "better" responses and the largest fraction of "worse" responses over the thirty year timespan.

TABLE 1 ABOUT HERE

TABLE 1

DISTRIBUTION OF RESPONSES TO PERSONAL FINANCES ITEM BY YEAR

YEAR	PERSONAL FINANCIAL SITUATION		
	Worse	Same	Better
1956	18.5	43.3	38.2
1960	18.6	46.5	34.9
1964	14.7	40.1	45.1
1968	19.8	46.6	33.6
1972	22.6	41.7	35.7
1976	30.8	34.8	34.3
1980	42.2	25.4	32.4
1984	28.1	28.6	43.3

Table 2 crosstabulates personal financial situation with vote for each presidential election year. The sample has been limited to persons who report voting for either the Democratic or Republican presidential candidate in each year. For every election except the 1964 Johnson-Goldwater landslide, the proportion voting for the incumbent party is lowest among respondents who report being "worse off" financially and highest among those who report being "better off." In most years, respondents in the "better" category are between 15% and 30% more likely to support the incumbent than those in the "worse" category. If respondents are pooled across years, approximately 63% of the "better off" respondents voted for the incumbent party compared to only 43% of the "worse off" respondents. Respondents who report no change in their financial situation fall between the extreme categories in their level of incumbent support, but, overall, appear to be slightly closer to "better off" respondents.

TABLE 2 ABOUT HERE

The relationship between personal financial situation and voting survives a control for partisanship. In Table 3, the data in Table 2 has been pooled and, for each year, voters classified by party and personal financial situation. The party variable is the standard seven category party identification item. In the table (and subsequently in the paper) incumbent party identifiers are those identifying with the party holding the presidency at the time of the election. Thus, a weak Republican would fall into the weak opposition category in 1980 and the weak incumbent category in

TABLE 2

PERCENTAGE VOTING FOR INCUMBENT PARTY
(non-voters excluded)

YEAR	PERSONAL FINANCIAL SITUATION		
	Worse	Same	Better
1956	45.4	55.3	69.9
1960	42.7	47.1	59.6
1964	67.3	65.2	67.3
1968	29.8	41.2	47.0
1972	51.0	70.0	68.4
1976	37.3	51.0	54.2
1980	35.9	42.4	41.8
1984	32.9	54.7	73.0
All years	43.4	55.1	62.7

1984. In each category of partisanship, voters with a "better" financial situation are more likely to vote for the incumbent than those "worse off" with a gap of 6% to 18% between the groups. The largest percentage effect of personal financial situation occurs in the independent category.

TABLE 3 ABOUT HERE

What is perhaps most striking about Tables 2 and 3 is not the correlation between personal financial situation and voting, but how much variation in incumbent support levels is left unexplained by economic conditions. In 1984 Ronald Reagan received 73% of the votes cast by those who reported an improved financial condition while Jimmy Carter only received 42% of the votes of those in a similar situation in 1980. Even though there is clearly some effect of personal financial situation on incumbent vote levels, is the effect large enough to account for significant inter-election vote swings?

Interpretation of the cross-sectional evidence is facilitated by estimating a set of cross-sectional regressions as in Table 4. The dependent variable in each year is an incumbent vote dummy which equals one if the voter supported in the incumbent and zero otherwise. The explanatory variables are personal financial situation (1 = better, 0 = same, -1 = worse), party (3 = strong incumbent, 2 = weak incumbent, etc.), race (1 = nonwhite, 0 = white), and family union membership (1 if someone in the respondent's family belongs to a labor union, 0 otherwise). The race and union variables have been multiplied by a presidency dummy (pres = 1 if the Democrats hold the presidency and pres = -1 if the Republicans hold the

TABLE 3

PERCENTAGE VOTING FOR INCUMBENT PARTY
(1956-1984 pooled; non-voters excluded)

PARTY IDENTIFICATION	PERSONAL FINANCIAL SITUATION		
	Worse	Same	Better
Strong Opposition	6.7	11.1	13.4
Weak Opposition	24.3	32.6	33.8
Independent Opposition	15.5	23.8	21.3
Independent	46.3	59.2	64.4
Independent Incumbent	72.1	79.9	85.6
Weak Incumbent	69.6	79.1	84.3
Strong Incumbent	89.6	93.7	96.0

presidency. A positive coefficient associated with an interaction term indicates that members of the relevant group (nonwhites or union members) are more likely to vote Democratic, regardless of which party holds the presidency.

TABLE 4 ABOUT HERE

The effect of improved individual economic conditions is consistently positive with coefficients ranging from 0.012 to 0.068. In all except one year (1964) a one-tailed t-test will reject the null hypothesis of no individual economic effect on presidential voting. But how large are the effects? Elsewhere (Kiewiet and Rivers, 1984: p. 378) it has been estimated that a one percent increase in real personal disposable income per capita increases the fraction of respondents "better off" by 1.3% and decreases the fraction of respondents "worse off" by 1.8%. Thus, a one percent real income increase should raise by mean of personal financial situation item (as it is coded here) by approximately 0.031. The cross-sectional estimates imply that a one percent real income increase will net the incumbent party at most a 0.2% increase in its vote share (using the largest estimated coefficient of 0.068). The average implied estimate of the effect of a one percent real income gain on incumbent vote share is less than 0.1%. Compare this figure with Kiewiet and Rivers' (1984: p. 375) survey of the aggregate time-series estimates: "A 1% decline in real income will cost the incumbent party between 0.5% and 1% of its vote share in the last election."

In summary, the cross-sectional evidence as it is conventionally

TABLE 4

OLS ESTIMATES OF SIMPLE RETROSPECTIVE VOTING MODEL

VARIABLE	YEAR			
	1956	1960	1964	1968
Constant	0.644 (0.012)	0.560 (0.012)	0.549 (0.008)	0.309 (0.015)
Personal Financial Situation	0.054 (0.014)	0.029 (0.014)	0.012 (0.009)	0.068 (0.017)
Party	0.143 (0.005)	0.150 (0.004)	0.125 (0.003)	0.125 (0.006)
Race x Pres	0.109 (0.051)	0.078 (0.042)	0.140 (0.024)	0.291 (0.045)
Union x Pres	0.061 (0.023)	0.041 (0.022)	0.073 (0.015)	0.016 (0.028)
R ²	0.47	0.49	0.39	0.39
N	1249	1393	3311	987
Residual sum of squares	158.5	177.4	447.7	145.4

TABLE 4
(continued)

OLS ESTIMATES OF SIMPLE RETROSPECTIVE VOTING MODEL

VARIABLE	YEAR			
	1972	1976	1980	1984
Constant	0.734 (0.019)	0.543 (0.012)	0.302 (0.015)	0.622 (0.012)
Personal Financial Situation	0.035 (0.020)	0.030 (0.012)	0.031 (0.014)	0.068 (0.012)
Party	0.096 (0.008)	0.140 (0.005)	0.126 (0.006)	0.138 (0.005)
Race x Pres	0.417 (0.051)	0.155 (0.034)	0.312 (0.041)	0.201 (0.032)
Union x Pres	0.083 (0.035)	0.031 (0.023)	0.059 (0.028)	0.084 (0.023)
R ²	0.33	0.62	0.42	0.51
N	672	1627	957	1361
Residual sum of squares	103.2	248.8	132.7	164.5

analyzed, produces statistically significant estimates of income effects on incumbent electoral support, but the implied estimates are three to ten times smaller than those found in aggregate time-series data. Kramer (1983) has argued that the aggregate time-series estimates are more believable, but most political scientists would feel more comfortable if the two sets of data produced consistent results. As will be seen, with suitable treatment the pooled cross-sectional data exhibit income effects as large as those in the aggregate time-series data.

3. ECONOMETRIC ISSUES

Estimation of the effects of individual and national level income change on voting behavior is straightforward if the relevant variables are observed. However, it is hard to imagine how the "politically relevant" portion of an individual's income could be identified. Even if detailed data on the composition of income were available in political surveys, what one person considers "politically relevant" might be dismissed as "politically irrelevant" by another. Theories with unobservable variables are not necessarily untestable. If, as is usually the case, the theory also imposes some restrictions upon the unobservables, econometric methods can be developed that allow certain parameters of the model to be estimated.

The purpose of this section is to provide a stochastic specification for economic voting. The specification is essentially that analyzed by Kramer (1983) with the addition of stochastic errors plus some standard restrictions on the measurement equations. The form of the equations, except for the aggregate income change variable, is familiar. Pooling the cross-sectional data used in Section 2 provides a dataset with variation in both individual and national level economic conditions. Unfortunately, as shown in Section 3.2, ordinary regression estimates using the pooled data will be inconsistent. A method for obtaining consistent estimates of the economic voting model is described. The estimation procedure incorporates a simple test of the Kramer hypothesis.

At the outset I would like to distinguish between issues of specification, identification, and estimation. This distinction is often either misunderstood or ignored, but it is crucial for the argument of this paper. The specification of a statistical model is the proper starting point for any sort of empirical work. In principle, model specification is not

affected by the availability of data, but in practice, of course, data availability does affect what models will be considered (if only by focusing our attention on particular problems). Nonetheless, a well-specified model should include all features thought to be of sufficient importance for the problem under study whether or not the relevant variables are measured. It is a useful exercise to write down a model as if one had complete control over what data will be collected (and an unlimited budget), even if only secondary analysis is contemplated. Only when a specification is settled upon should the problem of obtaining estimates of the model be addressed.

The specification of individual preferences adopted here allows both "self-interested" and "sociotropic" behavior. In the economic voting literature, "self-interest" usually refers to some narrowly defined economic interest such as maximization of purchasing power and is measured using the personal financial situation variable described in Section 2. "Sociotropic" behavior, according to Meehl (1977, p. 16) who coined the term, takes account of the preferences of others in some social group to which the individual belongs. The relevant group for "sociotropic voting" is usually taken to be the entire society, though a narrower definition could be employed. The concept of collective well-being, of course, raises all of the problems associated with social welfare functions, but I will ignore these problems and measure collective well-being with a simple statistic like the average income change in the population.

I will also assume that voting is retrospective. That is, instead of comparing the policy proposals of the parties, they compare the performance of the incumbent party against some absolute standard. If the performance of the incumbent party (in terms of utility experienced by the individual) exceeds some threshold of acceptable performance, then the incumbent party

receives the individual's vote; otherwise, the opposition party receives the individual's vote. Abstention is ignored so that the analysis is effectively restricted to "regular" voters. The incumbent party is defined as the party holding the presidency. These are all simplifications, more or less defensible, that make the analysis tractable.

Let x_{it}^* denote the change in real income of voter i under administration t ($t = 1, \dots, T$) that the voter attributes to political causes. Let $f(x^*|t)$ denote the distribution of "politically relevant" income changes under administration t and $E(x^*|t)$ the average income change attributable to administration t :

$$E(x_{it}^*|t) = \int x^* f(x^*|t) dx^* \quad (1)$$

Note that x_{it}^* and $E(x_{it}^*|t)$ are the same variable measured at different levels of aggregation. A narrowly self-interested voter might be concerned solely with his or her own income change x_{it}^* , while a sociotropic voter might be more concerned with national income change $E(x_{it}^*|t)$. Voters, of course, may misperceive the change in national income, but perceptual processes will not be modelled here. The specification adopted here would correspond to the reduced form of a model incorporating voter perceptions.

Individual voting behavior is described by the following behavioral equation (which can be derived from retrospective utility judgments, as described above, with appropriate assumptions on the distribution of utilities):

$$y_{it} = \alpha x_{it}^* + \beta E(x_{it}^*|t) + z_{it}' \gamma + u_{it} \quad (2)$$

where y_{it} is a dummy variable taking the value one if the individual votes for the incumbent party and $y_{it} = 0$ otherwise, z_{it} is a $k \times 1$ vector

of voter attributes (such as partisanship, demographics, etc.), α , β and γ are unknown parameters, and u_{it} is an unobservable disturbance capturing the effects of omitted attributes of voters or administration-specific factors. As usual, it is assumed that $E(u_{it}|x_{it}^*, z_{it}, t) = 0$.

If x_{it}^* were observed, there would be no problem in estimating equation (3.2). For large crosssectional samples, $E(x_{it}^*|t)$ can be replaced by its mean in the sample, $\bar{x}_t^* = (1/n) \sum_{i=1}^n x_{it}^*$, the T crosssectional samples can be pooled, and y_{it} can be regressed on x_{it}^* , \bar{x}_t^* and z_{it} . These estimates will be consistent as $n \rightarrow \infty$ for fixed T . Alternatively, the data could be differenced:

$$y_{it} - \bar{y}_t = \alpha(x_{it}^* - \bar{x}_t^*) + (z_{it} - \bar{z}_t)' \gamma + (u_{it} - \bar{u}_t) \quad (3)$$

with $\bar{y}_t = (1/n) \sum_{i=1}^n y_{it}$ and the other means defined similarly. A regression of $y_{it} - \bar{y}_t$ on $x_{it}^* - \bar{x}_t^*$ and $z_{it} - \bar{z}_t$ will produce consistent estimates of α and γ as either $n \rightarrow \infty$ or $T \rightarrow \infty$. Unbiased estimates of β can also be obtained. All results that follow will be asymptotic for $n \rightarrow \infty$. Under these conditions, the first approach will be satisfactory and somewhat simpler.

The measured income change x_{it}^* of voter i under administration t is composed of a "politically relevant" component x_{it}^* and a "politically irrelevant" component e_{it} :

$$x_{it} = x_{it}^* + e_{it} \quad (4)$$

Also, e_{it} may incorporate "pure" measurement error in the survey instrument. The politically irrelevant income component e_{it} is assumed to be uncorrelated with x_{it}^* and u_{it} :

$$E(e_{it}|x_{it}^*, t) = E(e_{it}u_{it}|x_{it}^*, t) = 0 \quad (5)$$

The restriction (5) is standard in measurement models, but is not imposed by Kramer (1983). Finally, we assume that u_{it} and e_{it} are homoscedastic and independent of one another: $E(u_{it}^2 | x_{it}^*, z_{it}, t) = \sigma_u^2 > 0$, $E(e_{it}^2 | x_{it}^*, z_{it}, t) = \sigma_e^2 \geq 0$, and $E(u_{it}e_{it} | x_{it}^*, z_{it}, t) = 0$.

3.2. Bias in Least Squares Estimates

The natural estimation procedure is to regress y_{it} on x_{it} , $\bar{x}_t = (1/n)\sum_{i=1}^n x_{it}$ and z_{it} . Kramer (1983) analyzed the bias that results from regressing y_{it} on x_{it} in a single cross-section and obtained the usual result: the attenuation in the estimated income effect is proportional to the reciprocal of the signal to noise ratio (the signal in this case being gross individual income change and noise being "politically irrelevant" income change). Kiewiet and Rivers (1984) showed that estimating the same equation (individual effects only, without any national level income variable) in a pooled cross-section gives an estimate of the income effect that is a weighted average of the separate cross-sectional estimates and the average time-series estimate. Since the average time-series estimate is subject to less attenuation than the cross-sectional estimates, the pooled cross-section estimate might be preferred to the cross-sectional estimates though it is still biased. I now consider the consequences of adding the average income change \bar{x}_t (as a measure of national level effects) to the pooled cross-section equation.

It is well-known that in an equation with only one variable subject to measurement error, the bias in the coefficient of the variable subject to error is unambiguously downward (Levi, 1973). On the other hand, the bias in estimating the remaining coefficients depends upon the correlations among the explanatory variables. For simplicity, we restrict our attention

to the case where $E(x_{it}^* | t)$ is the only other regressor. The correct specification involves the unobservable x_{it}^* :

$$y_{it} = \alpha x_{it}^* + \beta E(x_{it}^* | t) + u_{it} \quad (6)$$

where it is assumed, without loss of generality, that $E(x_{it}^* | t) = E(y_{it} | t) = 0$. The normal equations for $\hat{\alpha}$ and $\hat{\beta}$ are:

$$\sum_{i=1}^n \sum_{t=1}^T x_{it} y_{it} = \hat{\alpha} \sum_{i=1}^n \sum_{t=1}^T x_{it}^2 + \hat{\beta} \sum_{i=1}^n \sum_{t=1}^T x_{it} \bar{x}_t \quad (7)$$

$$\sum_{i=1}^n \sum_{t=1}^T \bar{x}_t y_{it} = \hat{\alpha} \sum_{i=1}^n \sum_{t=1}^T \bar{x}_t x_{it} + \hat{\beta} \sum_{i=1}^n \sum_{t=1}^T \bar{x}_t^2 \quad (8)$$

Letting $o_p(n^\delta)$ denote terms that tend in probability to zero (as $n \rightarrow \infty$) when multiplied by $n^{-\delta}$, we obtain:

$$\begin{aligned} \alpha \sum_{i=1}^n \sum_{t=1}^T x_{it}^2 + \beta \sum_{i=1}^n \sum_{t=1}^T x_{it}^* E(x_{it}^* | t) = \\ \hat{\alpha} \sum_{i=1}^n \sum_{t=1}^T (x_{it}^* + e_{it})^2 + n\hat{\beta} \sum_{t=1}^T E(x_{it}^* | t)^2 + o_p(n) \end{aligned} \quad (9)$$

$$\begin{aligned} \alpha \sum_{i=1}^n \sum_{t=1}^T x_{it}^* E(x_{it}^* | t) + n\beta \sum_{t=1}^T E(x_{it}^* | t)^2 = \\ n(\hat{\alpha} + \hat{\beta}) \sum_{t=1}^T E(x_{it}^* | t)^2 + o_p(n) \end{aligned} \quad (10)$$

Dividing by nT and taking probability limits (as $n \rightarrow \infty$) yields (after some rearrangement):

$$\text{plim}_{n \rightarrow \infty} \hat{\alpha} = \frac{\alpha V(x_{it}^*) - \text{plim}(\hat{\beta} - \beta) V[E(x_{it}^* | t)]}{V(x_{it}^*) + V(e_{it})} \quad (11)$$

$$\lim_{n \rightarrow \infty} \hat{\beta} - \beta = -\lim_{n \rightarrow \infty} (\hat{\alpha} - \alpha) \quad (12)$$

Solving for $\lim_{n \rightarrow \infty} \hat{\alpha}$ and $\lim_{n \rightarrow \infty} \hat{\beta}$ using the identity $V(x_{it}^*) = E[V(x_{it}^*|t)] + V[E(x_{it}^*|t)]$:

$$\lim_{n \rightarrow \infty} \hat{\alpha} = \frac{\alpha E[V(x_{it}^*|t)]}{E[V(x_{it}^*|t)] + \sigma_e^2} = \rho \alpha \quad (13)$$

$$\lim_{n \rightarrow \infty} \hat{\beta} = \beta + \frac{\sigma_e^2}{E[V(x_{it}^*|t)] + \sigma_e^2} = \beta + (1 - \rho)\alpha \quad (14)$$

where $\rho = E[V(x_{it}^*|t)]/[E[V(x_{it}^*|t)] + \sigma_e^2]$ is the average reliability of x_{it}^* (or, put another way, one minus the reciprocal of the signal to noise ratio). Two immediate conclusions can be drawn from equations (13) and (14). First, the existence of "politically irrelevant" income attenuates estimates of individual income effects upon voting (since $\lim_{n \rightarrow \infty} |\hat{\alpha}| \leq |\alpha|$), but does not necessarily attenuate estimates of national level or "sociotropic" effects. In fact, if both the individual and national level income effects are positive, the national level income effect will be over-estimated ($\lim_{n \rightarrow \infty} \hat{\beta} \geq \beta$). Even if no national level effects are present ($\beta = 0$), politically irrelevant income change may cause us to spuriously attribute some individual level effects to sociotropic behavior in pooled cross-sections. (The same bias also occurs in estimates of "contextual effects" models generally. See Fiorina and Rivers, 1986.)

These results for pooled cross-sections extend and generalize Kramer's results for the simple cross-sectional case. The possibility of bias in least squares estimates arises when $\sigma_e^2 > 0$. None of this however proves that the ordinary estimates are biased, since the proportion of income

change which is "politically relevant" is, at this point, purely a matter of conjecture. If voters ignore Kramer's macroeconomic calculations and use a simple retrospective voting rule attributing all income change to government policy, then we would have $\sigma_e^2 = 0$ and there would be no bias in the least squares estimates. The obvious question, which I turn to now, is whether the condition $\sigma_e^2 = 0$ is testable.

3.3. Identification

Initially a heuristic approach will be adopted which illustrates why it is possible to estimate the proportion of individual income change that is "politically relevant." I show that if there are two or more periods of data and that if the income distribution is nonstationary, then it is possible to estimate the economic voting model even though "politically relevant" income changes are not observed. The essential idea is that shifts in the mean and variance of the income distribution can be compared to electoral shifts. The degree to which an increase in the variance of the income distribution generates an electoral response gives us information about the fraction of income change that is "politically relevant."

Suppose that we have two periods of data ($T = 2$) and a large cross-section for each period. The means $E(y_{it}|t)$ and $E(x_{it}|t)$, variances $V(y_{it}|t)$ and $V(x_{it}|t)$, and covariances $\text{Cov}(x_{it}, y_{it}|t)$ and $\text{Cov}(\bar{x}_t, y_{it})$ will be consistently estimated as $n \rightarrow \infty$ for $t = 1, 2$. For the purpose of discussing identification, we may treat these quantities as known, since they can be determined up to a small amount of sampling error. The relations between these estimable quantities and the underlying theoretical parameters of the model are derived below:

$$E(y_{it}|t) = (\alpha + \beta)E(x_{it}^*|t) \quad (15)$$

$$V(y_{it}|t) = \alpha^2 V(x_{it}^*|t) + \sigma_u^2 \quad (16)$$

$$V(x_{it}|t) = V(x_{it}^*|t) + \sigma_e^2 \quad (17)$$

$$\text{Cov}(y_{it}, x_{it}|t) = \alpha \text{Cov}(x_{it}, x_{it}^*|t) = \alpha V(x_{it}^*|t) \quad (18)$$

$$V[E(y_{it}|t)] = (\alpha + \beta)^2 V[E(x_{it}^*|t)] \quad (19)$$

$$V[E(x_{it}|t)] = V[E(x_{it}^*|t)] \quad (20)$$

$$\text{Cov}[E(y_{it}|t), E(x_{it}|t)] = (\alpha + \beta) V[E(x_{it}^*|t)] \quad (21)$$

Some intuition can be gained from examining these equations which relate estimable quantities to unknown parameters and moments of the unobservable variables (such as x_{it}^*). Equation (15) relates the mean vote in each period $E(y_{it}|t)$ to the national level income change $E(x_{it}^*|t)$ for that period. This is (implicitly) the equation being estimated in an aggregate time series regression of votes on real income change. Thus, the aggregate time-series income coefficient reflects the effects of both individual and national level income effects. Equations (16-18) decompose the variances and covariances of the observable variables. In particular, the vote variance $V(y_{it}|t)$ is composed of a component due to variations in "politically relevant" income change $V(x_{it}^*|t)$ and a component due to variations in all remaining factors σ_u^2 . The variance in income changes $V(x_{it}|t)$ is decomposed into a "politically relevant" component $V(x_{it}^*|t)$ and a "politically irrelevant" component σ_e^2 , which are orthogonal. Since the variance of "politically irrelevant" income changes is assumed constant across periods, the variance of both components can be determined from two periods of data. The covariance of votes with income $\text{Cov}(y_{it}, x_{it}|t)$

during period t is proportional to the variance of "politically relevant" income change $V(x_{it}^*|t)$. The irrelevance of e_{it} to political behavior enables us to obtain equation (18) which, when coupled with equation (17), gives us much of the leverage over the problem. Finally, equations (19-21) give the unconditional variances and covariances of the variables.

To show that the model is identified, it suffices to show that it is possible to solve for the unknown parameters $(\alpha, \beta, \sigma_e^2, \sigma_u^2, E(x_{it}^*|t))$, and $V(x_{it}^*|t)$ in terms of the sample moments. For $T = 2$, we will have eleven equations (equations (15-18) each for $t = 1, 2$, plus equations (19-21)) in nine parameters. To solve for α , observe that:

$$\alpha = \frac{\text{Cov}(y_{11}, x_{11}|1) - \text{Cov}(y_{12}, x_{12}|2)}{V(x_{11}|1) - V(x_{12}|2)} \quad (22)$$

For equation (22) to be effective, we require $V(x_{11}|1) \neq V(x_{12}|2)$. In the general T period case, it will be necessary for the variance of the income distribution to be different in at least two periods. If there is no change in the variance of the income distribution over time, it will not be possible to decompose the variance and the model will not be identified.

Expressions for the remaining parameters are easily obtained:

$$\beta = \frac{E(y_{11}|1) - \alpha E(x_{11}|1)}{E(x_{11}|1)} = \frac{E(y_{12}|2) - \alpha E(x_{12}|2)}{E(x_{12}|2)} \quad (23)$$

$$V(x_{it}^*|t) = \text{Cov}(y_{it}, x_{it}|t) / \alpha \quad (24)$$

$$\sigma_e^2 = V(x_{11}|1) - V(x_{11}^*|1) = V(x_{12}|2) - V(x_{12}^*|2) \quad (25)$$

$$\sigma_u^2 = V(y_{11}|1) - \beta^2 V(x_{11}^*|1) = V(y_{12}|2) - \beta^2 V(x_{12}^*|2) \quad (26)$$

As before, these calculations depend upon some nonstationarity in the income distribution. Specifically, to obtain an estimate of β we require $E(x_{11}^*|1) \neq E(x_{12}^*|2)$. If the mean of the income distribution does not shift, then it is clearly infeasible to determine the effects of aggregate income shifts on voting. Aggregate time-series estimation would fail for the same reason.

Note from the above equations that there are several ways to obtain estimates of some of the parameters. This means that even for $T = 2$, the economic voting model is over-identified. In particular, no external instrumental variables are required for estimation since identifying restrictions arise naturally out of the dynamic specification. The overidentification of the economic voting model without external instruments is a somewhat surprising finding (though see Hausman and Taylor, 1982, and Griliches and Hausman, 1986, for suggestive analyses in similar contexts), but is indicative of the benefits of pooling cross-sections over time.

3.4. Estimation

When a model is over-identified, the relevant issue becomes how to employ the sample information efficiently in obtaining estimates. The heuristic approach adopted in Section 3.3 is awkward for the general problem (2) with many regressors. In this section, I briefly describe a consistent and asymptotically efficient estimator for the economic voting model. The discussion is intentionally nontechnical and readers interested in a complete discussion of the statistical properties of the estimator are referred to Rivers (1986).

Though it is not necessary, I derive the estimator under the assumption of joint normality. It is shown in Rivers (1986) how to dispense with the

normality assumption, but the logic of the estimator is more transparent if this assumption is made. A few preliminary distributional results are necessary. If $(x_{it}^*, z_{it}, u_{it}, e_{it})$ has a joint normal distribution for each period t , then the marginal likelihood for x_{it} (conditional on t) and the conditional likelihood for y_{it} (conditional on x_{it} , z_{it} and t) have simple forms. The density of x_{it} for period t is given by:

$$f(x_{it}|t; \mu_t, \omega_t^2) = \frac{1}{\omega_t} \phi\left(\frac{x_{it} - \mu_t}{\omega_t}\right) \quad (27)$$

where $\mu_t = E(x_{it}^*|t)$, $\omega_t^2 = V(x_{it}^*|t) + \sigma_e^2$, and $\phi(z) = (2\pi)^{-1/2} e^{-z^2/2}$ denotes the standardized normal density function. Next, we derive the distribution of y_{it} conditional on x_{it} , z_{it} and t . The conditional mean of y_{it} is given by:

$$E(y_{it}|x_{it}, z_{it}, t) = \alpha x_{it} + \beta E(x_{it}^*|t) + \gamma' z_{it} - \frac{\alpha \sigma_e^2}{V(x_{it}^*|t) + \sigma_e^2} [x_{it} - E(x_{it}^*|t)] \quad (28)$$

where use was made of the identity $\text{Cov}(x_{it}, e_{it}|z_{it}, t) = \sigma_e^2$. Let $\lambda = -\alpha \sigma_e^2$. The conditional variance of y_{it} is given by:

$$V(y_{it}|x_{it}, z_{it}, t) = \sigma_u^2 - \frac{\lambda^2}{\omega_t^2} \quad (29)$$

The joint normality assumption ensures that the conditional distribution of y_{it} is also normal so that the conditional density of y_{it} is given by:

$$g(y_{it}|x_{it}, z_{it}, t; \alpha, \beta, \gamma, \sigma_u^2, \lambda, \mu_t, \omega_t^2) = \left(\sigma_u^2 - \frac{\lambda^2}{\omega_t^2}\right)^{-1/2} \phi\left(\frac{y_{it} - \alpha x_{it} - \beta \mu_t - \gamma' z_{it} - \lambda(x_{it} - \mu_t)/\omega_t^2}{[\sigma_u^2 - (\lambda^2/\omega_t^2)]^{1/2}}\right) \quad (30)$$

From the densities (27) and (30), we define two log likelihood functions:

$$L_n^f(\mu_1, \dots, \mu_T, \omega_1^2, \dots, \omega_T^2) = \sum_{t=1}^T \sum_{i=1}^n \log f(x_{it}|t; \mu_t, \omega_t^2) \quad (31)$$

$$L_n^g(\alpha, \beta, \gamma, \sigma_u^2, \sigma_e^2, \lambda, \mu_1, \dots, \mu_T, \omega_1^2, \dots, \omega_T^2) = \sum_{t=1}^T \sum_{i=1}^n \log g(y_{it}|x_{it}, z_{it}, t; \alpha, \beta, \gamma, \sigma_u^2, \sigma_e^2, \lambda, \mu_t, \omega_t^2) \quad (32)$$

Note that (31) is not the likelihood of x_{it} conditional on z_{it} and t , so that the joint likelihood for y_{it} and x_{it} conditional on z_{it} and t is not the sum of L^f and L^g . Nonetheless, if full information maximum likelihood estimates of μ_t and ω_t^2 were available, then the joint likelihood could be concentrated in these parameters and full information maximum likelihood estimates of $(\alpha, \beta, \gamma, \sigma_u^2, \sigma_e^2, \lambda)$ could be obtained by maximizing the concentrated likelihood with respect to these parameters. In fact, maximizing the concentrated likelihood is equivalent to maximizing (32) with μ_t and ω_t^2 replaced by their maximum likelihood estimates. Generally, however, this is not a feasible strategy since the full information estimates of μ_t and ω_t^2 are difficult to obtain. The estimator I propose does, however, exploit this relationship and provides estimates with the same large sample properties as the maximum likelihood estimator.

With these preliminaries completed, it is now possible to describe a simple two step estimator for the economic voting model. First, one calculates the mean \bar{x}_t and variance s_t^2 of x_{it} for each period $t = 1, \dots, T$. These estimates can be thought of as marginal maximum likelihood estimates as they maximize the marginal likelihood (31) of x_{it} . Next,

replace μ_t by \bar{x}_t and ω_t^2 by s_t^2 in the conditional likelihood function (32):

$$L_n^{\hat{g}}(\alpha, \beta, \gamma, \sigma_u^2, \sigma_e^2, \lambda) = L_n^g(\alpha, \beta, \gamma, \sigma_u^2, \sigma_e^2, \lambda, \bar{x}_1, \dots, \bar{x}_T, s_1^2, \dots, s_T^2) \quad (33)$$

The " $\hat{\cdot}$ " over g indicates that the parameters μ_t and ω_t^2 have been replaced by their marginal ML estimates. Maximization of (33) with respect to the remaining parameters $(\alpha, \beta, \gamma, \sigma_u^2, \sigma_e^2, \lambda)$ is extremely simple and can be carried out with any regression package. The procedure amounts to running an ordinary least squares regression of y_{it} on x_{it} , \bar{x}_t , z_{it} and $(x_{it} - \bar{x}_t)/s_t^2$ to obtain parameter estimates $\hat{\alpha}$, $\hat{\beta}$, $\hat{\gamma}$ and $\hat{\lambda}$, respectively. These estimates are referred to as two stage conditional maximum likelihood (2SCML) estimates for the obvious reasons. (Essentially the same procedure was used by Rivers and Vuong, 1986, in the context of a simultaneous probit model.)

The 2SCML estimator has several desirable properties. First, the 2SCML estimates are consistent and approximately normally distributed for large n . Second, the estimator can be shown to be optimal among a wide class of estimators (specifically, among all generalized method of moments estimators). Under the normality assumption, the 2SCML estimator is asymptotically efficient in the sense that it has minimum variance among regular asymptotic normal estimators.

At a more practical level, the 2SCML estimator has one feature that makes it particularly convenient for the economic voting model. As we have seen the central empirical issue raised by Kramer (1983) is whether voting depends on the gross income change x_{it} or only on some "politically relevant" fraction of individual income change x_{it}^* . If $\sigma_e^2 = 0$, then we have simple retrospective voting with no discrimination by voters between

various components of income change. Alternatively, if $\sigma_e^2 > 0$, then Kramer is correct and existing survey-based estimates of economic voting underestimate income effects. The hypothesis $\sigma_e^2 = 0$ is equivalent to the hypothesis that $\lambda = 0$. The t-statistic associated with $\hat{\lambda}$ from the 2SCML estimation procedure tests this hypothesis. Rivers (1986) shows that this test has good properties. In particular, it is locally most powerful in detecting departures from the null hypothesis. The test statistic is reported in Section 4.

4. EMPIRICAL RESULTS

In Section 2, it was seen that regression estimates of income effects based on cross-sectional data are typically rather small, though still statistically significant, while it was not possible to estimate the effects of national economic conditions. If Kramer's argument is correct, the individual income variable (personal financial situation) measures many politically irrelevant income changes and the effect is to attenuate estimates of individual economic effects on voting.

By pooling the eight cross-section analyzed in Section 2, it becomes possible to estimate a national income effect as well as the individual income effect. Unfortunately, it was shown in Section 3 that the same measurement problems that bias the cross-sectional estimates will still affect the pooled cross-section estimates. Pooling, by itself, does not solve the problems described by Kramer. Pooling does, however, make possible the estimation method described in Section 3 that allows for the possibility of "politically irrelevant" income changes being captured by the personal finances item. In this section, consistent estimates of the economic voting model are obtained and compared to OLS estimates of the same models. The variable definitions remain the same as in Section 2.

The first column of Table 5 presents OLS estimates based on the pooled cross-sections. The regression equation has the same form as those reported in Table 4 and the coefficient estimates are quite similar. The coefficient of personal financial situation in this equation is 0.049 which falls within the range of estimates in Table 4. Given the large number of observations in the pooled dataset (11,664), the t-statistic associated with this coefficient is large (9.8), but the same remarks about the small size of the estimated individual income effect still apply.

The second column of Table 5 reestimates the equation in the first column using the 2SCML method. The difference in estimates is dramatic. Now the individual income effect is 0.322 or nearly seven times greater than the OLS estimates. Using the calculation described in Section 2, the implied vote gain accruing to the incumbent party from a one percent increase in real disposable income per capita is approximately 1%--a larger income effect than that originally estimated by Kramer (1971)! The coefficients of the remaining variables in this equation are stable across the two equations.

TABLE 5 ABOUT HERE

To obtain an estimate of σ_e^2 , the variance of the "politically irrelevant" income component, it is necessary to divide $-\lambda$ by α (the individual income coefficient). Based on this equation, it appears that about 50% of the variance in responses to the personal finances item is "politically irrelevant," which accounts for the severe bias in the OLS estimates. A formal test of the hypothesis $H_0: \sigma_e^2 = 0$ against the alternative $H_A: \sigma_e^2 > 0$ can be carried out, as described in Section 3, using the t-statistic associated with λ . Under the null hypothesis, the test statistic has a limiting standardized normal distribution. For large n , the one-tailed 0.05 critical level is 1.67, which is far exceeded in this case since the value of the test statistic is 12.1. Kramer's hypothesis receives very strong support.

We have shown that it is possible to find large income effects in micro-

TABLE 5
POOLED CROSS-SECTION ESTIMATES (1956-1984)

VARIABLE	METHOD			
	OLS	2SCMLE	OLS	2SCMLE
Constant	0.527 (0.004)	0.476 (0.005)	0.442 (0.007)	0.442 (0.007)
Party ID	0.139 (0.002)	0.138 (0.002)	0.138 (0.002)	0.138 (0.002)
Race x Pres	0.180 (0.013)	0.177 (0.013)	0.176 (0.012)	0.176 (0.013)
Union x Pres	-0.013 (0.007)	-0.019 (0.007)	-0.026 (0.007)	-0.026 (0.007)
South x Pres	-0.161 (0.008)	-0.167 (0.008)	-0.169 (0.008)	-0.169 (0.008)
Personal financial situation	0.049 (0.005)	0.322 (0.022)	0.038 (0.005)	0.288 (0.033)
Average financial situation	---	---	0.462 (0.029)	0.212 (0.019)
λ	---	-0.158 (0.012)	---	-0.128 (0.019)
R^2	0.417	0.424	0.429	0.431
Number of observations	11,664	11,664	11,664	11,664
Residual sum of squares	1663.9	1641.0	1629.0	1622.7

level survey data without invoking the sociotropic voting hypothesis. Nonetheless, it is still an interesting question whether voters respond to national level economic conditions apart from their personal experiences. The criteria here for sociotropic voting is quite stringent in the sense that only responses to actual aggregate income shifts are considered.

The third column of Table 5 again presents a set of OLS estimates similar to the first column. The coefficient of personal financial situation almost vanishes, while the national level economic variable (the average of the individual personal financial situation responses) appears with a very large and significant coefficient (0.462). If it were not for the inconsistency of these estimates when voters distinguish between components of income, these estimates might be interpreted as strong evidence in favor of the sociotropic voting hypothesis.

The last column of Table 5 reestimates the equation in the third column using the 2SCML procedure. Once again the shift in the coefficient estimates is striking. In the OLS estimates, the sociotropic effect was twelve times larger than the individual effect; for the 2SCML estimates the individual effect (0.288) is now larger than the sociotropic effect (0.212) which is reduced in magnitude by more than 50%. Both, however, are substantial and statistically significant. Taken together, these coefficient estimates imply a more than one percent increase in vote share for the incumbent party when real income rises by one percent. This estimate is even at the high end of aggregate time-series estimates of real income effects.

Finally, the estimated fraction of the variance in the personal finances item which is "politically irrelevant" is over 50% in this equation. The null hypothesis $H_0: \sigma_e^2 = 0$ is also easily rejected with a t-statistic of

6.7. The personal finances item clearly taps many financial considerations that voters consider irrelevant to the political choices facing them.

5. CONCLUSIONS

The empirical results reported above, based on the same data that have in the past produced small estimates of individual income effects on voting, show that voters respond to both microeconomic and macroeconomic conditions. Standard regression estimates understate individual economic effects by a factor of roughly seven. Put more concretely, the conventional cross-sectional survey estimates imply that at least a five percent increase in real income is required to raise the incumbent party's vote share by one percent. Adjusting for the proportion of personal income change that voters consider "politically irrelevant" (using the methods described in Section 3), we find that with individual income effects alone a one percent real income gain will increase the incumbent's party vote share by about one percent. This survey-based estimate of income effects is as large as that found in aggregate time-series analyses. Thus, with proper treatment there is no discrepancy between the micro survey and aggregate time-series evidence. The Kramer hypothesis--that voters treat some fraction of the change in their personal incomes as "politically irrelevant"--receives strong support.

Although ordinary regression estimates overstate the size of the so-called "sociotropic" effect, voters still appear to be sensitive to national level income effects as well as their individual economic situation even when consistent estimation procedures are applied to the economic voting model. The size of the national level effect is slightly smaller than the individual effect in presidential elections, but both effects are statistically significant and roughly of the same order of magnitude. The evidence in favor of sociotropic voting presented here is not subject to Kramer's (1983) criticisms.

The analyses reported here do not settle many outstanding questions in the economic voting literature, but the methods described should enable some of these questions to be addressed. For example, is it possible to objectively identify some sources financial hardship that voters consider more "politically relevant" than others? More specific economic indicators, such as unemployment, could be treated in addition to the more general personal financial situation variable. How do transfers affect the political behavior of recipients? If a voter, for whatever reason, suffers economic hardship and benefits from a government income maintenance program, is he or she more likely to support the incumbent party? More generally, the issue of whether certain economic conditions provoke a policy-oriented response from voters rather than purely retrospective behavior needs to be investigated. That the analysis of these and other issues in the economic voting model with require careful econometric treatment to avoid the pitfalls described by Kramer is obvious. But it should also now be apparent that such analyses are feasible and can yield surprising results.

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